

Laparoscopic simple prostatectomy: A reasonable option for large prostatic adenomas

Abdulrahman Al-Aown, Evangelos Liatsikos¹, Vasileios Panagopoulos¹, Iason Kyriazis¹, Panagiotis Kallidonis¹, Ioannis Georgiopoulos¹, Marinos Vasilas¹, Stolzenburg Jens-Uwe²

Department of Urology, Armed Forces Hospital Southern Region, Khamis Mushait, Kingdom of Saudi Arabia, ¹Department of Urology, University of Patras, Greece, ²Department of Urology, University of Leipzig, Germany

Abstract

Aim of the Study: In this work, surgical technique followed by two academic departments on laparoscopic simple prostatectomy (LSP) of large prostatic adenomas is being described.

Materials and Methods: The initial cumulative experience from 11 patients with lower urinary tract symptoms of benign prostatic hyperplasia origin subjected to LSP is being presented.

Results: All cases had prostatic adenomas greater than 80 ml. Mean operation time was 99.5 min (values from 70 to 150 min) and mean blood loss was 205 ml (values from 100 to 300 ml). Blood transfusion was deemed necessary in one case. Bladder catheter was removed successfully on postoperative day 5 in all cases. No significant postoperative complication was noted. At a 3 months follow-up a significant decrease in International Prostate Symptom Score (IPSS) was evident in all patients (mean IPSS 27.7 vs. 15.3 preoperative vs. postoperative accordingly).

Conclusions: According to our data and similarly to the rest of the LSP literature, laparoscopic excision of voluminous prostatic adenomas is a feasible and safe procedure. Nevertheless, further investigation including a larger number of patients and long-term follow-up is deemed necessary before making definite conclusions regarding the approach.

Key Words: Adenomectomy, benign prostatic hyperplasia, bladder outlet obstruction, laparoscopic simple prostatectomy

Address for correspondence:

Dr. Abdulrahman Al-Aown, P.O. Box: 11740, Abha 61321, Kingdom of Saudi Arabia. E-mail: aown22@hotmail.com

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INTRODUCTION

Current technology provides a wide range of minimally invasive treatment options for the surgical management of benign prostatic hyperplasia (BPH). Transurethral resection of the prostate (TURP) remains the gold standard technique for small and medium prostatic volumes. Yet, the ideal surgical approach

for quite large adenomas is still under debate. According to current European Association of Urology guidelines, the recommended technique of simple prostatectomy, in adenomas exceeding 80 g is the Holmium Laser Enucleation of the Prostate.^[1] The latter provides substantial and durable symptom relief with minimum morbidity.^[2,3] Nevertheless, apart from the relative high cost of laser treatment, particular technology is not worldwide available and thus open simple prostatectomy (OSP) remains still the most commonly applied approach in the management of large prostatic adenomas. Although quite effective, OSP has been associated with substantial morbidity.^[4,5]

Laparoscopic simple prostatectomy (LSP) was firstly introduced by Mariano *et al.* in 2002.^[6] Since then, only a limited number of centers employ the technique despite the uniformly reported

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favorable outcomes with regard to reduced perioperative morbidity and equivalent effectiveness as compared with the open approach.^[7] Recently, LSP for large adenomas was further supported by a randomized comparison with TURP. Less residual adenoma, shorter catheterization time but more blood loss in the laparoscopic arm, in addition to lower rates of late complications and superior functional outcomes for LSP after the second postoperative year, were evident.^[8]

In this work, the favorable experience of two university departments with LSP is presented in an attempt to increase accumulate data on the subject and contribute on future attempts to define the exact indications of laparoscopic excision in the surgical therapy of voluminous prostatic adenomas.

PATIENTS AND METHODS

Patient characteristics

In total 11 patients were subjected to LSP in our departments. All operations were performed by two experienced laparoscopic surgeons with wide experience in laparoscopic radical prostatectomy. An informed consent had been obtained by all patients, which had been informed on the alternative available treatment options (OSP, TURP). Patients were selected based on bothersome lower urinary tract symptoms of BPH origin with prostatic volumes greater than 80 cm³ (values from 98 to 220). Preoperatively, prostate cancer had been excluded based on prostate specific antigen values and digital rectal examination and all patients were subjected to a standard preoperative evaluation protocol including uroflowmetry, sonographic evaluation of prostatic volume and International Prostate Symptom Score questioner.

Surgical technique

Under general anesthesia, the patient is placed in a 10° Trendelenburg position. A 2-cm paraumbilical incision is created, and the anterior rectus sheath is horizontally incised. Using blunt dissection, the musculature of rectus muscle is penetrated to access the space between rectus muscle and posterior rectus sheath. The latter space is then caudally expanded using a finger pointing pubic symphysis until the preperitoneal space beneath the arcuate line of the abdomen (linea semicircularis) is reached. A 12-mm high-pressure balloon trocar with a 10-mm optical channel is introduced to the dissected plane and using a 0° optic, the preperitoneal space is enlarged using balloon insufflation under direct vision. The balloon trocar is deflated and removed, and a 10/12-mm Blunt Tip Hasson Trocar is introduced and fixed in place using stay sutures placed in the anterior rectus sheath. A continuous carbon dioxide flow at a pressure of 12 mmHg is established, and the 0° optic is reintroduced in the new trocar. The pubic symphysis and the inferior epigastric vessels are identified and under direct vision 4 working ports

are introduced as follows. Two 5-mm trocars are placed in the right lower abdominal wall. The first is introduced two finger breadths medial to the right anterior superior iliac spine and the second in the middle between the latter and the paraumbilical camera trocar. In the left lower abdominal wall two trocars are introduced mirroring right side trocar positions. The most lateral left abdominal port hosts a 12 mm trocar to allow the introduction of needles and laparoscopic baskets and the other a 10 mm trocar.

After entering the extraperitoneal space a gross dissection of the fat overlying the prostate and the bladder is performed, and the location of vesicoprostatic junction is identified. A 3–4 cm vertical cystotomy incision is performed at this level revealing the underlying bladder neck [Figure 1]. Ureteral orifices are identified and bladder mucosa is inspected for concomitant pathologies. The medial prostatic lobe is being grasped and pulled up and underneath that a semicircular incision of the vesical mucosa at the bladder neck is performed and extended from the 8 to 4 O'clock through 6 O'clock. The incision is carefully deepened until the identification of the adenoma and the prostatic capsule at its external aspect. Within the plane between the prostatic capsule and the adenoma, prostatic enucleation is then performed. Using both harmonic scalpel and suction cannula, enucleation of the adenoma starts from the one lobe and progresses to the other and toward the apex. Coagulation as necessary to obtain a bloodless field of dissection throughout this step of the operation is used with the exception of the caudal apex [Figure 2]. At this level, the use of coagulation should be minimal to avoid potential avulsion of the sphincter. The retrieved specimen is introduced in an endobag and placed away from the operating field till the end of the operation. In the case of a voluminous medial lobe, its dissection is following the complete mobilization of the lateral

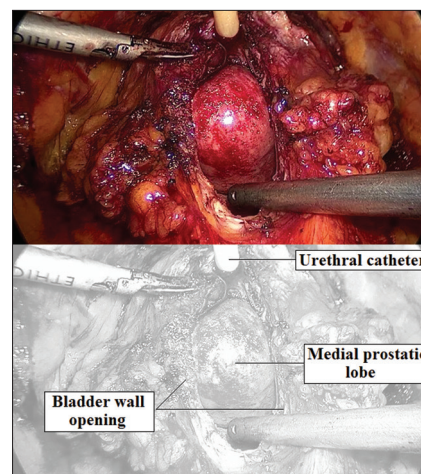


Figure 1: Protruding medial prostatic lobe after longitudinal cystotomy. Traction of the urethral catheter upwards facilitates better visualization of bladder trigon

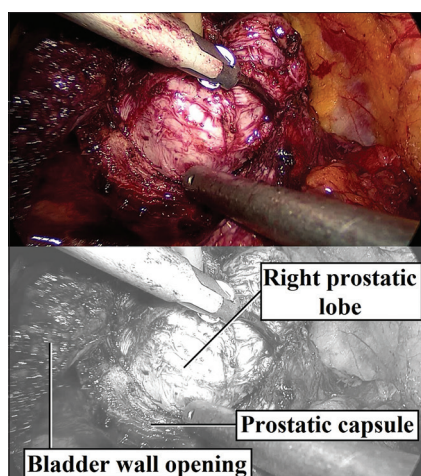


Figure 2: Dissection using the harmonic scalpel within the plane between prostatic capsule and adenoma allows prostatic enucleation in a relatively bloodless field

lobes. During this step, separation of medial lobe from the rest of the adenoma is usually necessary to allow its proper grasping and careful division from bladder trigone.

Sutures that anchor the posterior vesical neck mucosa deep in the prostatic cavum are then placed leading to bladder neck trigonization [Figure 3]. The latter trigonisation of prostatic cavity facilitates proper epithelialization and eases potential future bladder catheterization. A Foley catheter is introduced and inflated, and cystotomy is closed using absorbable barbed sutures in a single layer. The most lateral left trocar is then removed, and its opening is enlarged as necessary to allow the extraction of the endobag containing the specimen. Deep fascial stitches are then placed to the site of specimen extraction to close fascial opening and avoid postoperative hernia formation. A drain is introduced through one of the working ports and placed subpubically. Under direct vision, the rest of the working trocars are removed. After extracting the umbilical trocar, the stay sutures used to fix optical port in place are tied closing anterior rectus sheath defect. Cutaneous incisions are finally sutured.

Postoperative protocol and follow-up

Extraperitoneal drain was retrieved on postoperative day one and all patients were discharged on postoperative day 3. Urinary catheter was removed on postoperative day 5 after cystographic confirmation of urinary tract integrity in accordance to our radical prostatectomy protocol.^[9] A follow-up visit was scheduled 3 months following the operation assessing post void residual urine volume, Q_{max} and International Prostate Symptom Score (IPSS) score.

RESULTS

Mean patients age was 63 years (values from 52 to 74), mean prostatic volume was 158 cm³ (values from 98 to 220) and

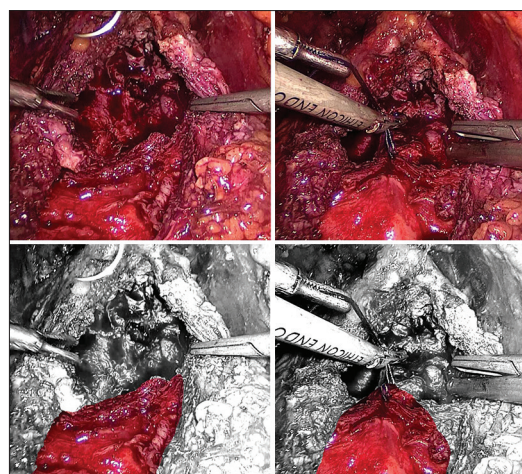


Figure 3: Prostatic cavity before and after trigonisation. The vesical mucosa is anchored in the prostatic cavum. Bladder neck mucosa has been highlighted

mean preoperative IPSS score was 27.7 (values from 22 to 31). Preoperative characteristics of each patient included in the current cohort are summarized in Table I.

All operations were uneventful. Median operative time was 100 min (values from 70 to 150) and blood loss was minimal in all cases apart from one case with 200 cm³ prostate volume necessitating transfusion during the operation with one unit of concentrated red blood cells. Bladder irrigation was rarely necessary beyond postoperative day 2. All drains were removed on day 1. On day 5 all patients but one were rendered catheter free. In the single patient necessitating further bladder catheterization, urine leak around the bladder neck was evidenced during the routine cystography on day 5. Catheter removal was postponed for 10 days in a particular case without any additional complications. No postoperative incontinence or potency alterations were noted. NO wound complications were noted either. Pathologic evaluation of extracted specimens confirmed the presence of benign glandular-stromal hyperplasia in all cases. Median volume of resected specimens was 112 g (values from 60 to 170). A significant decrease in IPSS score 3 months after the operation was reported by all patients. A summary of perioperative and postoperative outcomes are summarized in Table 2.

DISCUSSION

Gland volume, available equipment and surgeon's experience play an important role in the decision on the proper surgical approach for patients with benign prostate hyperplasia. TURP using either monopolar or bipolar electrosurgery is currently the gold standard technique for small and medium prostatic volumes. Nevertheless, TURP for large adenomas has been associated with longer operative times and higher complication rates and morbidity.^[10] A certain threshold on prostate size above which

Table 1: Patient's demographics and preoperative data

Patient number	Age (years)	PV (cm ³ -U/S)	PVR (cm ³)	IPSS score	Uroflow (Q _{max} -ml/s)	Retention (yes/no)
1	52	98	0	28	7	No
2	59	125	150	30	5	No
3	63	129	400	32	-	Yes
4	70	110	220	27	6	No
5	70	198	150	22	4	No
6	74	220	250	29	9	No
7	53	140	180	24	11	No
8	62	152	-	24	5	No
9	74	142	240	31	9	No
10	65	205	80	27	7	No
11	52	220	150	31	7	No
Mean	63.091	158.0909	182	27.72727273	7	

PV: Prostatic volume, PVR: Postvoid residual urine volume, IPSS: International Prostate Symptom Score

Table 2: Perioperative and postoperative data

Patient number	OT (min)	EBL (ml)	VR (g)	TRF (units)	Postoperative retention	Postoperative IPSS (3 months)	Uroflow (Q _{max} -ml/s)
1	120	250	60	No	No	15	19.2
2	100	100	100	No	No	21	18.5
3	95	180	90	No	No	23	22.8
4	70	250	80	No	No	14	18
5	100	300	150	Yes (1)	No	9	24.5
6	125	160	170	No	No	12	23.1
7	80	190	120	No	No	16	19.3
8	85	270	140	No	No	11	17.2
9	100	200	100	No	No	21	20
10	70	160	170	No	No	14	21.9
11	150	200	60	No	No	12	18.5
Mean	99.54545	205.4545	112.7273			15.27272727	20.27273

OT: Operation time, EBL: Estimated blood loss, TRF: Transfusion, IPSS: International Prostate Symptom Score, VR: Volume of resected tissue

TURP is contraindicated does not exist. Yet, in the case of voluminous adenomas other surgical options, including open prostatectomy or laser enucleation are often selected. Among them, OSP is the most widespread surgical technique.^[11] The latter provides substantial and durable symptom relief with long-term outcomes documented for more than 5 years in randomized controlled studies.^[12] Still, OSP has been associated with substantial morbidity. Serretta *et al.*, in a retrospective study assessing 1804 OSP cases reported that the approach was associated with significant bleeding rates (11.6%) often requiring blood transfusion and a significant rate of postoperative infection (8.6%).^[4] Gratzke *et al.*, in a prospective multicenter study including 902 patients reported similar results.^[5]

In an attempt to overcome the significant perioperative morbidity of OSP, several alternative treatment modalities have been developed. Laparoscopic adenomectomy has emerged as a reasonable option in the management of voluminous prostate glands. Several studies comparing LSP with OSP have shown similar postoperative functional outcomes.^[7] In addition, the laparoscopic procedure is constantly associated with less blood loss, shorter irrigation time, shorter hospitalization, and lower postoperative morbidity.^[7,13,14]

Similarly to the rest of the literature, in our small series of patients, minimum blood loss, no significant complications and

satisfactory postoperative symptom relief, as documented by a decrease in IPSS at 3 months follow-up, were evident. It should be stressed that the main reason why only a limited number of patients have been subjected to LSP in our departments is that in the absence of mature data on the subject the procedure has been preserved only for really big prostate glands as an alternative to open prostatectomy. Prostate sizes presented in the current cohort where almost entirely larger than 100 g and a mean prostatic volume of 158 cm³ is one of the largest reported in the relevant literature. Even in this setting of challenging cases the outcomes were very satisfying and encouraging.

Minimum blood loss during LSP can be attributed to several factors. The extraperitoneal CO₂ insufflation pressure in addition to the use of harmonic scalpel renders prostatic enucleation a relative bloodless step and hemostatic sutures regularly placed on the 5th and 7th O'clock of bladder neck during open prostatectomy are considered unnecessary. In addition, the adoption of the subcapsular plane for prostate extraction avoids injury of the surrounding venous plexus, which is a known source of significant bleeding during radical prostatectomy procedures. Postoperatively irrigation requirements were also minimum while clot retention was not observed in any case.

A considerable drawback of the presented technique is that the previous surgery of the lower abdomen can alter the anatomy

of extraperitoneal space and render LSP even more technical demanding. In our series, one of our last cases (patient: II in table data) had a history of bilateral inguinal hernia repair with mesh placement (performed laparoscopically in one side). The particular procedure was associated with increased operative time and resulted in a high volume of residual adenoma. In particular, after a quite bothersome and time-consuming dissection of the extraperitoneal space, dense adhesions of prostatic adenoma to the prostatic capsule were encountered which in turn made enucleation of the adenoma almost impossible. Periurethral prostatic tissue was removed into small pieces and finally only 60 g of tissue out of the initial 220 g prostate were extracted. Interestingly, postoperative peak flow rate, residual urine volume and IPSS score were excellent, underlying that a complete prostatic enucleation and extraction is not a prerequisite of good functional outcome, at least in the short-term. Still, based on our experience we would consider a previous inguinal hernia repair as a relative contraindication of the approach.

A potential stiff learning curve for the majority of urologists could be considered an additional drawback of LSP.^[15] Handling of the large adenoma during enucleation could be sometimes difficult with the mass often interfering with the operating field. An excellent collaboration with the first assistant is mandatory while separation of prostate into its lobes and extracting each of them after enucleation could preserve space within the restricted prostatic cavum. Passing a retraction suture through the adenoma can aid its proper grasping and retraction in several cases facilitating dissection. It should be mentioned that in our cohort all operations were performed by two laparoscopic surgeons with wide experience in radical prostatectomy and hence our favorable outcomes in the reported initial series might not represent the initial outcomes of the average surgical team dealing with the presented procedure.

Robotic assistance for simple prostatectomy could ease the steep learning curve of the operation preserving at the same time the advantages of the laparoscopic approach. Current experience with robotic-assisted simple prostatectomy is limited mainly due to the theoretic higher costs comparing to open and transurethral approaches. Nevertheless, initial data report favorable results in terms of morbidity, hospitalization time, and postoperative functional results.^[16-18] Further documentation is deemed necessary to elucidate whether robotic assistance for simple prostatectomy offers significant improvements in BPH management or should be considered as a technical overtreatment.

Additional limitations of the current study include the small number of patients and the lack of mid and long-term outcome data. Still, our results are in accordance with the rest of the literature reporting promising midterm results in the majority

of reported series. Asimakopoulos *et al.* in a meta-analysis comparing LSP with open approach including data from fourteen published studies and 626 patients in total, reported less blood loss and a reduced irrigation requirement, a shorter postoperative catheterization period, and a shorter hospital stay, at the expense of an extended operative time in the laparoscopic arm.^[7] In addition, due to the retrospective character of the study, preoperative urodynamic and complete postoperative functional data, which would have documented better the effectiveness of the approach are missing. Thus, further investigation including prospective randomized long-term data are deemed necessary before drawing definite conclusions regarding the effectiveness of laparoscopic adenectomy.

CONCLUSIONS

Based on our small cohort and our short-term follow-up data, LSP for BPH is a feasible and safe procedure with favorable postoperative outcomes. Although current studies on LSP are limited, the particular technique appears to offer equivalent functional outcomes with OSP yet with lower morbidity. Important limitation of this laparoscopic technique is its stiff learning curve that renders it a good option only for experienced laparoscopic surgeons. In addition, previous inguinal hernia repair might render the procedure even more challenging. Further evaluation, including long-term data and randomized studies comparing the technique with other treatment options are necessary.

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